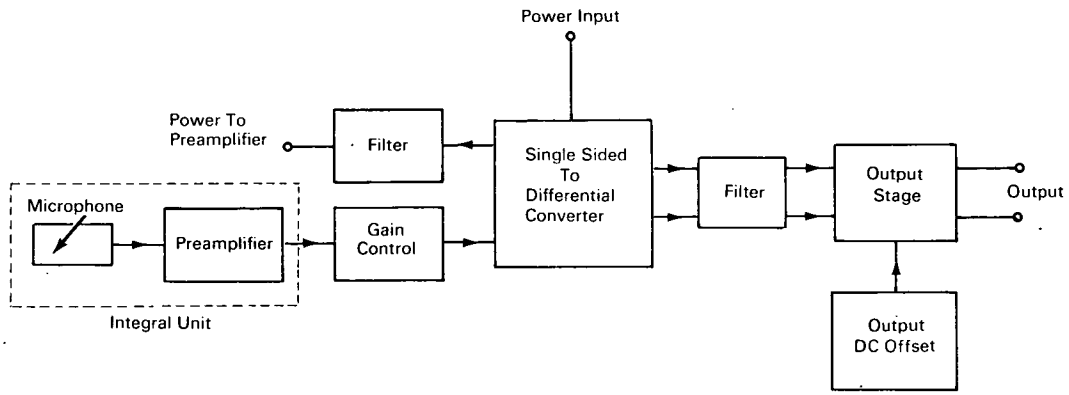
# NASA TECH BRIEF



## Phonocardiograph System Monitors Heart Sounds




**The problem:**

To design a phonocardiograph system that can be used under severe environmental conditions, such as exist aboard a spacecraft, to monitor the mechanical activity of the heart. The system should provide output signals that can be recorded on tape, presented aurally, or transmitted to a remote receiving station via telemetry.

**The solution:**

An electronic system employing a piezoelectric-crystal microphone with an integral preamplifier, and a signal conditioner having special frequency characteristics.

**How it's done:**

The microphone-preamplifier transducer is attached to the chest in the region of the heart by means of a double-backed adhesive washer. A flexible miniature cable connects the transducer to the signal conditioner. The preamplifier acts as an impedance converter and also serves to filter out undesired low-frequency signals. The transducer is encapsulated in an epoxy resin that insulates the transducer case from ground.

The signal conditioner contains a gain control and circuitry to convert the single-sided transducer signal to the required balanced differential output level. This circuitry also provides the differential output offset voltage required for a telemetry input. The overall frequency response of the transducer-signal conditioner is flat from 20 cps to 200 cps. Power consumption of the signal conditioner unit (excluding the transducer) is approximately 0.6 milliampere from a +10 volt supply, and 0.2 milliampere from a −10 volt supply. The unit, of welded cordwood construction, employs metal housings for the components to avoid radio frequency interference and ac field coupling. The overall case size of the unit is 1.75 inches × 1.5 inches × 0.39 inch.

(continued overleaf)

**Notes:**

1. This instrument can be used in conjunction with an electrocardiograph to provide a complete graphic record of the mechanical and electrical activity of the heart for use by medical diagnosticians.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas, 77001
   Reference: B66-10154

**Patent status:**

No patent action is contemplated by NASA.

Source: Beckman Instruments, Inc.,
under contract to
Manned Spacecraft Center
(MSC-185)